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Case Report

Late perforation of anterior mitral leaflet after surgical resection of the subaortic membrane

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ABSTRACT

A 54-year-old woman who underwent surgical resection of the subaortic membrane 10 years earlier presented with new onset dyspnea. Cardiovascular examination revealed 3–4/6 pansystolic murmur at the apex. She was found to have severe mitral regurgitation (MR) with transthoracic echocardiography; 2D and real-time-3D transesophageal echocardiography demonstrated severe MR through anterior mitral leaflet perforation with precise localization. The patient was treated with surgery in which the perforated segment was closed by direct suture technique and discharged on postoperative 5th day.
<**Learning objective:** Late anterior mitral leaflet perforation after surgical or interventional procedures has rarely been reported. We present this case to emphasize the role of traumatic injury to weak endothelial surfaces such as a valve leaflet in the development of late leaflet perforation after surgical or interventional procedures.>

Introduction

Mitral leaflet perforation (MLP) is a rarely encountered clinical condition that may result in acute severe mitral regurgitation (MR). MLP may be found together with mitral valve aneurysm (MVA) or in isolated form. Anterior MLP with or without aneurysm is more frequently observed compared to posterior MLP and is commonly encountered in the early or late course of aortic valve infective endocarditis (IE) [1]. Primary pathology or degeneration of valvular tissue is other mechanistic cause of MLP other than IE [2,3]. MLP cases have been rarely reported during or subsequent to different surgical or interventional cardiac procedures that are relevant to mitral valve and left ventricular outflow tract (LVOT) [4–10].

In this context, we present a case of late small anterior mitral leaflet aneurysm perforation 10 years after surgical resection of the subaortic membrane without any evidence of previous or active endocarditis.

Case report

A 54-year-old woman who had a history of open-heart surgery for subaortic membrane resection 10 years earlier was admitted to our clinic with complaints of new onset dyspnea and palpitation. Cardiovascular examination revealed 3–4/6 pansystolic murmur at the apex. Electrocardiography showed atrial fibrillation with a rapid ventricular rate. Transthoracic echocardiography (TTE) showed severe eccentric regurgitant jet from the LVOT to the left atrium through the perforated segment of the basal part of anterior mitral leaflet just below the aortic non-coronary cusp (Fig. 1A; supplementary material online, Video 1). No residual subaortic membrane was seen. Moderate aortic regurgitation and tricuspid fibrocalcific aortic valve were also seen with TTE imaging. The patient was on warfarin therapy due to atrial fibrillation and no mitral valve regurgitation was noted in the regular follow-up visits. Physical examination, laboratory markers, and blood cultures were negative for IE. Transesophageal echocardiography (TEE) revealed echo dropout at the top of a small aneurysmal sac which was located at the basal part of the A2 scallop of the anterior mitral leaflet (Fig. 1B; supplementary material online, Video 2). Real-time three-dimensional TEE (RT-3D-TEE) imaging clearly showed systolic explicitation of a small aneurysm with perforation (Fig. 2A) at the region of the basal part of the A2 scallop of the anterior mitral leaflet and diastolic collapse of the perforated aneurysmal sac (Fig. 2B). The patient was referred to surgery for mitral valve repair after coronary angiography, which was completely normal. Intraoperative inspection verified echocardiography by revealing the small aneurysm with perforation at the A2 scallop of the anterior mitral leaflet, 2 mm next to mitral

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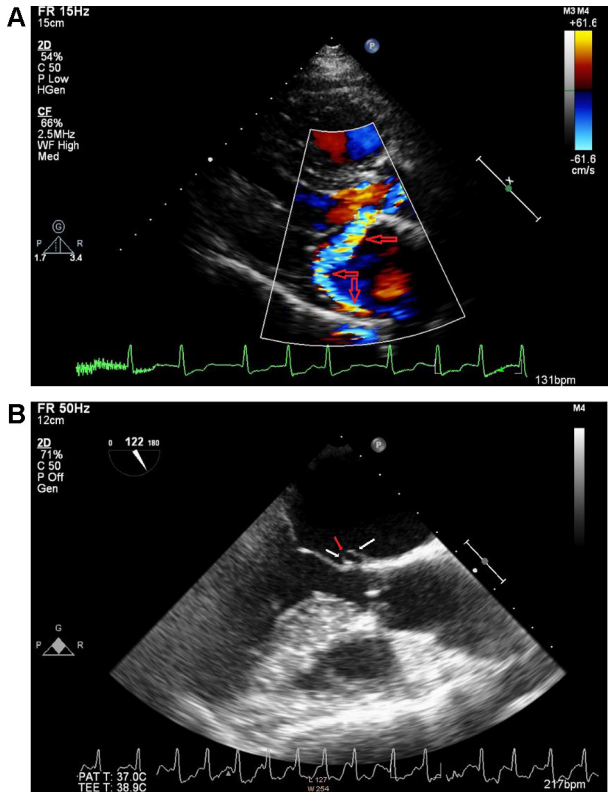

Fig. 1. (A) Transthoracic parasternal long-axis view showing severe eccentric regurgitant jet (red arrows) from left ventricular outflow tract (LVOT) to left atrium.
(B) 2D transesophageal echocardiography displaying a small anterior mitral leaflet aneurysm (white arrows) and echo dropout (red arrow) suggesting perforation.

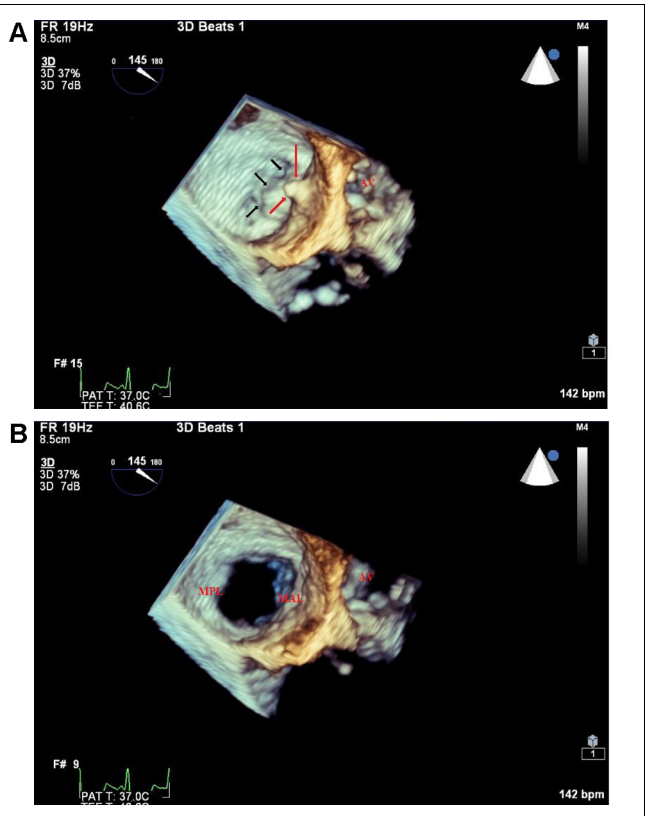

Fig. 2. (A) Real-time 3D-transesophageal echocardiography revealing a localized saccular aneurysm (red arrows) toward the left atrium at the region of the A2 scallop of anterior mitral leaflet during systole and (B) diastolic collapse of the aneurysmal sac. Black arrows show mitral commissure.
AV, aortic valve; MAL, mitral anterior leaflet; MPL, mitral posterior leaflet.

annulus. The perforated segment was closed by direct suture technique and the patient was discharged on postoperative 5th day.

Discussion

The most common form of subaortic stenosis is the membranous type and the membrane may be attached to the anterior leaflet of the mitral valve and encircle the LVOT. The location of this membrane ranges from just below the aortic valve to further down into the left ventricle. Many patients present with associated aortic regurgitation (AR). Definitive therapy for subaortic membrane is generally surgical resection.

Although mitral leaflet tears may be seen as an acute complication during surgical subaortic membrane resection [4], cases of anterior mitral leaflet perforation have been reported in the relatively late or late postoperative period after surgical resection of the subaortic membrane [5,6]. Ozyuksel et al. reported a case similar to ours [5]. In this case, anterior mitral leaflet perforation and severe MR associated with the perforation had developed 4 months after the surgical treatment of discrete subaortic membrane. These authors suggested inappropriate surgical technique as the reason for perforation. Anterior mitral leaflet perforation has been reported even 30 years after surgical subaortic membrane resection [6].

Fibrous continuity between the aortic annuli and anterior mitral leaflet where the subaortic membrane might be attached or continues to this location could be injured with an apparent tear, perforation, or be minimally damaged such as by endothelial denudation during surgery. Continuing tissue reaction after the index tissue injury and endothelial denudation could have led to late perforation with or without the formation of aneurysms by weakening the mitral leaflet. Systolic left ventricular pressure stress and diastolic hemodynamic stress due to moderate aortic regurgitation, which is frequently observed in these patients, to the injured leaflet tissue may be contributory factors by weakening the leaflet tissue leading to aneurysm and subsequent perforation. It is possible that index trauma during the initial surgery along with other continual contributing factors mentioned above could have resulted in the observations of this case.

MLP with or without aneurysm has rarely been reported during or subsequent to several surgical or interventional cardiac procedures that are relevant to the mitral valve and LVOT [7–10]. All of these interventional procedures potentially have minimal or more traumatic contact to the mitral leaflet suggesting the role of index traumatic injury to the valve leaflet for the development of late perforation.

We present this report to underline the importance of trauma to the weak endothelial surface such as the valve leaflet, in the surgical or interventional procedures, even if it is minimal.

Conflict of interest

The authors report no financial relationships or conflicts of interest regarding the content herein.

Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at http://dx.doi.org/10.1016/j.jccase.2015.08.010.

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